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REMARKS/ARGUMENTS

In the Office Action dated August 21, 2003, Claims 1-64 are pending. Claims 9, 12-16, 21, 23-25, 37-46, 48-54, and 58-64 are withdrawn from further consideration pursuant to 37 CFR § 1.142(b) as being drawn to a nonelected species/invention. Claims 4-8, 19, and 47 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-3, 10-11, 17-18, 20, 22, 26, 28-29, and 36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,158,666 to Banks, et al. in view of U.S. Patent No. 5,477,596 to Schlosstein, et al. Claim 27 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Banks, et al. in view of Schlosstein, et al. and further in view of U.S. Patent No. 3,722,711 to Seidel. Claim 35 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Banks, et al. in view of Schlosstein, et al. and further in view of U.S. Patent No. 5,718,545 to Husted.

Claims 4-8 and 19 would be allowable if rewritten to overcome the rejection under 35 U.S.C. § 112, second paragraph and to include all of the limitations of the base claim and any intervening claim. Claim 30-34 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and intervening claims. Claim 47 would also be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. § 112, second paragraph. Claims 55-57 are allowed.

With regard to the rejection of Claims 4-8, 19, and 47 under 35 U.S.C. § 112, second paragraph, Applicant has amended Claims 4, 7, 19, and 47 to resolve the informalities identified by the Examiner. Applicant submits that each of Claims 4-8, 19, and 47 are now in condition for allowance.

Regarding the rejection of Claims 1-3, 10-11, 17-18, 20, 22, 26, 28-29, and 36 under 35 U.S.C. § 103(a) as being unpatentable over Banks, et al. in view of Schlosstein, et al, Applicant respectfully submits that neither Banks, et al. nor Schlosstein, et al. teaches the claimed invention. In particular, neither reference teaches a production system for processing a workpiece, including "an index system including a plurality of index devices removably mounted on the workpiece at known longitudinally spaced locations therealong, and a

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longitudinally extending index member releasably engaged with at least two of the index devices such that a position and orientation of the index member are fixed relative to the workpiece by the index devices, the index member having position-indicating features therealong and "a machine module mounted for longitudinal movement along the index member and operable to perform an operation, the machine module being operable to detect the position-indicating features on the index member and thereby determine a position of the machine module relative to the workpiece" as set forth in Claim 1.

In her remarks, the Examiner states that "Banks does not teach that the rails 102 include any sort of 'position-indicating features' that are detectable by the 'machine module' 104 to determine the position of the 'machine module' relative to the workpiece." However, the Examiner asserts that it would have been obvious "to have provided the positional scale and reader taught by Schlosstein et al. to the device taught by Banks et al. for the purpose of enabling the control system for Banks' device to position the mini-riveting system with 'great accuracy lengthwise along the path of the stringer so that the holes are drilled at the correct position' as taught by Schlosstein et al. (col. 5, line 62 through col. 6, line 2)." Applicant respectfully disagrees.

Banks, et al. describes a mini-riveter system 100 in which an inside end-effector 104 and an outside end-effector 108 "home" on coordination holes that are used to align two panels 110. The inside and outside end effectors 104, 108 are movable along internal and external guide rails 106, 102, but neither rail 106, 102 is an "index member having position-indicating features therealong." Col. 5, line 66 to col. 6, line 12. Additionally, the end effectors 104, 108 are not machine modules that detect position-indicating features and determine a position relative to the workpiece, as set forth in Claim 1. Banks, et al. specifically states that the end effectors do not home, or zero, their coordinate systems on any fixture. See col. 6, lines 52 to 55. Nor do the end effectors otherwise detect features of a fixture. Instead, the "mini-riveter system 100 establishes a positioning reference coordinate system relative to the index pins 120 installed in the lap joint 116. . . . [B]y homing on the coordination holes, there is no need for a fixture to home the end-effectors." For example, the external end effector 108 is positioned using a homing sensor 218 and a final external position encoder 220. The homing sensor zeros its x, y coordinate system

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based on a nearby detected index pin 120, e.g., re-zeroing at every bay to reduce inaccuracy from "fastener-induced growth of material or temperature variation." The final external position encoder 220 includes wheels that engage the rail 130. Col. 9, line 66 to col. 10, line 14. Neither the homing sensor nor the final external position encoder detects position-indicating features on an index member to determine a position.

Schlosstein, et al. describes a machine for positioning clips in a stringer and drilling holes in the stringer and clips. A support bed 30 for the stringer 14 includes a box beam 31. A carriage 40, including a frame 42 and truck 44, travels along a pair of rails 48, 48' on the back side of the box beam 31. A position sensor system includes a positional scale 100 mounted on the box beam 31 and a reader 102 on the truck. In operation, the stringer 14 is abutted against an end stop 106, and the positional sensor system 100, 102 is used to position the carriage 40 along the stringer relative a reference position established by the stop 106.

Applicant submits that there is no motivation to combine the positional scale and reader taught by Schlosstein, et al. with the mini-riveter of Banks et al. Banks, et al. specifically discounts the use of a position-establishing fixture, stating that "unlike prior art fastening devices which home or zero their coordinate systems on a fixture, the mini-riveter system 100 is able to home on the coordination holes being used to align the two panels 110." Col. 6, lines 52 to 55. "The use of a fixture . . . would reduce the overall advantages gained by aligning components with coordination holes." Col. 7, lines 23 to 25. Thus, Banks, et al. teaches away from the use of a position-establishing fixture, and instead uses the homing sensor and final external position encoder. The homing sensor and final external position encoder are not dependent on position-indicating features on the rails, which, similar to conventional fixture tooling, can be undesirably changed by temperature variations. See col. 1, line lines 19 to 22. Therefore, the use an index member having position-indicating features with the mini-riveter of Banks, et al. would not have been obvious, even in light of Schlosstein, et al.

For the foregoing reasons, Applicant submits that Claim 1 is patentable over the cited art. Accordingly, each of Claims 2-3, 10-11, 17-18, 20, 22, 26, 28-29, and 36, which are dependent on Claim 1, are also patentable. Further, the dependent claims also provide additional bases of patentability over the cited art. For example, Claim 2 recites that "the index member has a

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machine-readable position-indicating strip mounted therealong," and Claim 3 recites that "the position-indicating strip comprises an encoder tape." Schlosstein, et al. does not show such a strip-like position-indicating device, and further does not teach or suggest that the strip can be an encoder tape. Claim 22 states that "the index support system includes a pair of clamp assemblies operable to applying clamping forces to the workpiece from opposite sides thereof." The Examiner has asserted that upper and lower portions of a single side of the workpiece can be considered "opposite." However, Applicant submits that the upper and lower portions of a single side of the workpiece are not opposite sides of the workpiece, as indicated by the claim. *disagree*

With regard to the rejection of Claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Banks, et al. in view of Schlosstein, et al. and further in view of Seidel, Applicant submits that all of the cited references fail to teach or suggest the invention as claimed. Claim 27 is dependent on Claims 1 and 26. Claim 26 states that "the machine module comprises a drill mounted on a frame that is traversable along the index member." Claim 27 further states that the production system includes "an automatic drill changer mounted on the frame and supporting a plurality of drilling tools, the drill changer and drill being cooperative to change a drilling tool held in the drill." Seidel describes a machine tool with a pair of arms for transferring tools between a tool storage mechanism and a spindle. However, neither Banks, et al. nor Seidel provide any motivation for providing a drill changer on the outside end effector described by Banks, et al. In fact, Banks, et al. is directed to a mini-riveter system for fastening panels "without the use of large cumbersome machinery." Col. 5, lines 63 to 65. Further, the drill unit 262 of the outside end effector of Banks, et al. can be removed from a holder 264 by unscrewing a quick release drill knob 266. Thus, to the extent that a different sized drill device is required on the end effector, the drill can be replaced without an automatic drill changer.

Similarly, Applicant submits that Banks, et al., Schlosstein, et al., and Husted fail to teach or suggest the invention as set forth in Claim 35. Claim 35 is also dependent on Claim 26 and, hence, Claim 1. Claim 35 states that "the drill is rotatable about at least one rotation axis for varying a drilling direction along which a hole is drilled in the workpiece." Husted describes a tool positioning device in which a spindle block can be pivoted. However, neither Banks, et al. nor Husted provide any motivation for varying a drilling direction of the end effector of Banks,

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et al. Instead, Banks, et al. teaches that the end effector is disposed normal to the surface of the workpiece to form holes therethrough for rivets. There is no teaching or suggestion that angled holes can or should be formed. Indeed, the rivet drive unit 276, which upsets the rivets, is configured to adjust in the z-axis, i.e., perpendicular to the surface of the workpiece. Further, the inside end effector is configured to be arranged opposite the workpiece from the outside end effector, i.e., there is no indication that the inside end effector is configured to oppose the outside end effector for upsetting a rivet positioned in a hole that is not perpendicular to the workpiece.

For the foregoing reasons, Applicant submits that Claims 1-8, 10-11, 17-20, 22, 26-36, 47, and 55-57 are allowable.

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CONCLUSIONS

In view of the amendments and remarks presented above, Applicant submits that the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicant's undersigned attorney in order to resolve any remaining issues.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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